

## § 154.2104

vessel when the pressure of the inerting, padding, or purging gas exceeds 90 percent of the lowest setting of any pressure relief valve on the vessel; and

(3) Locate the pressure-sensing devices required by paragraphs (n)(1) and (n)(2) of this section in the inerting, padding, or purging gas piping downstream of any devices in the gas piping that could potentially isolate the vessel from the sensing devices.

### § 154.2104 Pigging system.

(a) If a pigging system is used to clear cargo in the cargo lines to the tank vessel while the vessel is connected to the facility vapor control system (VCS), the pigging system must be designed with the following safety features:

(1) A bypass loop installed in the main liquid cargo line that contains the pig-receiving device, through which all the liquid flow is channeled during pigging operations. The pig must act as a seal to separate the vessel from the compressed inert gas that is used to propel it as the pig travels from the pig launcher to the pig-receiving device;

(2) A mechanism for restricting liquid and gas flow so that the vessel, personnel, and environment are not endangered. The compressed inert gas flow capacity that this mechanism secures must not be more than 95 percent of the combined capacity of all vessel and facility VCS relief valves located upstream of the facility's remotely operated cargo vapor shutoff valve required by 33 CFR 154.2101(a);

(3) A fast-action automatic shutoff valve such as a solenoid valve, which closes on a high-pressure signal from the pressure sensor required by 33 CFR 154.2103(f), located in the liquid bypass loop downstream of the pig-receiving device;

(4) An interlock with the main cargo line manual block valve so that line-clearing operations cannot begin unless the main cargo line manual block valve is closed; and

(5) An automatic means to detect arrival of the pig at the pig-receiving device.

(b) If a cargo line clearance system without using pigging is used to clear cargo in the cargo lines to the tank

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vessel while the vessel is connected to the facility VCS, the cargo line clearance system must be approved by the Commandant.

### § 154.2105 Fire, explosion, and detonation protection.

This section applies only to facilities that control vapors of flammable, combustible, or non-high flash point liquid cargoes.

(a) A vapor control system (VCS) with a single facility vapor connection that receives inerted cargo vapor from a vessel and processes it with a vapor recovery unit must—

(1) Be capable of inerting the vapor collection line in accordance with 33 CFR 154.2107(a) before receiving the vessel's vapor and have at least one oxygen analyzer, which satisfies the requirements of 33 CFR 154.2107(f)(1) and (2), (g), and (h)(2) and (3), sampling the vapor concentration continuously at a point as close as practicable to the facility vapor connection. The total pipe length between the analyzer and the facility vapor connection must not exceed 6 meters (19.7 feet); or

(2) Have a detonation arrester located as close as practicable to the facility vapor connection. The total pipe length between the detonation arrester and the facility vapor connection must not exceed 18 meters (59.1 feet) and the vapor piping between the detonation arrester and the facility vapor connection must be protected from any potential internal or external ignition source.

(b) A VCS with a single facility vapor connection that receives only inerted cargo vapor from a vessel and processes it with a vapor destruction unit must—

(1) Satisfy the requirements of paragraph (a)(1) of this section and have a detonation arrester located as close as practicable to the facility vapor connection. The oxygen analyzer required by paragraph (a)(1) can be located 4 meters (13.1 feet) downstream of the detonation arrester. The total pipe length between the detonation arrester and the facility vapor connection must not exceed 18 meters (59.1 feet) and the vapor piping between the detonation